1.0 Introduction

1.1 Storage Study

The Yakima River Basin Water Storage Feasibility Study (Storage Study) is an ongoing evaluation of how to provide additional stored water for the benefit of fish, irrigation, and municipal water supply within the Yakima River basin. This may be achieved (as shown on frontispiece A) by constructing new facilities to impound Yakima River basin waters or by importing water from the Columbia River for exchange with irrigation entities willing to forego all or part of their current Yakima River diversions. Prior investigations have identified a potential alternative for importing Columbia River water to the Yakima River basin. Because importing Columbia River water would involve the construction of a major offstream storage reservoir in Black Rock Valley, it has been termed the Black Rock alternative.

1.1.1 Authorization and Purpose

Congress directed the Secretary of the Interior, acting through the Bureau of Reclamation (Reclamation), to conduct a feasibility study of options for additional water storage for the Yakima River basin. Section 214 of the Act of February 20, 2003, (Public Law 108-7) contains this authorization and includes the provision "… with emphasis on the feasibility of storage of Columbia River water in the potential Black Rock Reservoir and the benefit of additional storage to endangered and threatened fish, irrigated agriculture, and municipal water supply."

Reclamation initiated the Storage Study in May 2003. As guided by the authorization, the Storage Study will identify and examine the viability and acceptability of various potential storage alternatives.

A purpose of the Storage Study is to develop additional stored water and manage it in a manner to improve anadromous fish habitat. To this end, the water supply goal is to restore the flow regime of the Yakima and Naches Rivers to some semblance of the natural (unregulated) hydrograph. The process being used in the Storage Study for achieving this goal is to: (1) define potential "blocks" of Yakima River water that may be made available through an exchange, and (2) assess how such blocks could be shaped, by spill and regulation, to most closely mimic the historic flow regime of an unregulated Yakima River system.

Another purpose of the Storage Study is to improve the reliability of the Yakima Project water supply for junior (proratable) water rights in dry years. Current Yakima Project legal, contractual, and operational parameters provide that when there is a deficiency in the available water supply to meet recognized water rights, senior (nonproratable) water rights are served first and shortages are assessed against junior (proratable) water rights. In the dry years of 1994 and 2001, this resulted in a 37 percent water supply being available for proratable water rights. A water supply goal of providing not less than 70 percent supply for proratable rights in dry years

has historically been used in the Yakima River basin for planning purposes. This goal is being used for all Yakima Project proratable irrigation water rights.

A further purpose of the Storage Study is to meet growth demand for municipal water supply. Future population growth in the Yakima River basin will increase the need for municipal water supply. A water exchange could meet this need.

1.1.2 State of Washington Participation

State support for the Storage Study was provided in the 2003 Legislative session. The capital budget included a $4 million appropriation for the Washington Department of Ecology (Ecology) with the provision the funds "… are provided solely for expenditure under a contract between the department of ecology and the United States bureau of reclamation for the development of plans, engineering, and financing reports and other preconstruction activities associated with the development of water storage projects in the Yakima river basin, consistent with the Yakima river basin water enhancement project, P.L. 103-434. The initial water storage feasibility study shall be for the Black Rock reservoir project."

Reclamation and Ecology entered into a Memorandum of Agreement for Cost Sharing on November 14, 2003. This agreement complies with Reclamation's framework for general principles and administration of cost sharing for the Storage Study.

1.1.3 Process

Reclamation's Upper Columbia Area Office in Yakima, Washington, is managing and directing the Storage Study. A Plan of Study was prepared and published September 2003 and is available on the Storage Study website at http://www.usbr.gov/pn/programs/storage_study/index.html. For management purposes, the Storage Study is a four-phase, multi-year process culminating with the Storage Study Feasibility Report/Environmental Impact Statement, which will be the document used by Reclamation and the Secretary of the Interior to decide whether to seek congressional authorization for construction of any Storage Study alternative(s).

1.2 Black Rock Alternative Assessment

Mindful of the directives, Reclamation placed priority on study activities related to the Black Rock alternative. The appraisal assessment of the Black Rock alternative (Assessment), a component of the Storage Study, was undertaken to provide further information on a water exchange, to assist in understanding the major features of the alternative, potential effects, and to help guide future Storage Study activities.

The primary objectives of the Assessment are to determine whether a Columbia River-Yakima River water exchange by means of the Black Rock alternative is technically viable, whether it would meet the goals of the Storage Study, and whether it should be carried forward as an element of the Storage Study.

This Assessment addresses such questions as the potential of water delivery and the willingness of water exchange participants, the availability of Columbia River water to exchange, water rights and contractual matters associated with a potential exchange, geologic and hydrogeology site characteristics, potential facility options, and possible conceptual plans to divert, store, and deliver exchange water. It addresses the question of what a water exchange may physically accomplish in improving the availability and reliability of the Yakima River basin water supply to meet the Storage Study purposes. This Assessment also identifies some primary issues involved with the Black Rock alternative that will need to be addressed, and it sets the framework for further analyses.

However, this Assessment does not quantify annual benefits that may be realized from the Black Rock alternative. Work on estimating benefit unit values has begun, but final estimates, and the annual benefits, have yet to be determined. As a consequence, a benefit-cost analyses has not yet been prepared, and this Summary Report does not address whether the Black Rock alternative is economically justified. Likewise, a cost allocation to reimbursable and nonreimbursable project purposes has not been made and an analysis of the ability to repay the reimbursable costs has not been made. Further, environmental and cultural impacts have not been determined, and the public acceptability of the Black Rock alternative has yet to be determined.

1.3 Assessment Summary Report

Reclamation prepared a series of technical reports documenting the Assessment work conducted to date and the primary findings. Details of the concepts, assumptions, technical standards, and analysis applied to the Black Rock alternative components are in the technical reports. This *Summary Report Appraisal Assessment of the Black Rock Alternative* (Summary Report) consolidates information from the individual technical reports into a summary of the work conducted and the primary findings. The individual Reclamation reports will be published as part of a technical series on the Storage Study website at, or near, the time the Summary Report is released.

This Summary Report completes the Assessment and most activities of the second phase (pre-plan formulation) of the Storage Study. Because this Assessment includes some of the September 2003 Plan of Study phase 3 plan formulation activities associated with the Black Rock alternative, future work on these activities would be significantly reduced.

2.0 Black Rock Alternative

2.1 Defining the Alternative

Reclamation has conducted a number of studies in the past seeking solutions to recurring water supply shortages in the Yakima River basin. As to additional storage opportunities, the studies have focused on potential sites within the Yakima River basin.

Prompted by severe water supply shortages in the 1990s and economic studies of the negative impacts of such shortages, a renewed local effort emerged to seek additional water supply. This local initiative had its roots in a July 30, 2001, resolution adopted by the Board of Benton County Commissioners (Benton Board). The resolution authorized: (1) a program for examining opportunities internal to the Yakima River basin for enhancing water flows and external through importation of Columbia River water, and (2) the expenditure of $500,000 for related studies. This program was called the Yakima River Storage Enhancement Initiative.

The Benton Board placed initial emphasis on the study of a reservoir site located east of the city of Yakima, near the intersection of State Highways (SH) 24 and 241 and at the east end of Black Rock Valley on Dry Creek (see frontispiece A). The alternative, as conceptually described in an April 1993 paper prepared by the State Department of Natural Resources [1], would store water pumped from the Columbia River for transfer to the Yakima River basin.

In the fall of 2001, the Benton Board engaged Washington Infrastructure Services, Inc. (WIS) to study the technical feasibility and approximate cost of a Black Rock reservoir project. The project would withdraw water from the Columbia River at or near Priest Rapids Dam, pump it to a new, large storage reservoir in Black Rock Valley, and convey it from the reservoir to a junction with Roza Canal in the lower Yakima River basin. No attempt was made to determine the manner or cost of further distribution of water beyond that point.

WIS analyzed two project sizes and reported findings in a May 2002 report [2]. The larger project would consist of a 4,000-cfs pump-turbine facility taking water from Priest Rapids Lake for transmission to a Black Rock reservoir. A concrete face rockfill dam would store a total capacity of 1.7 million acre-feet of water in the reservoir. The reservoir outflow system would be sized for 2,000-cfs delivery to Roza Canal with an energy recovery plant (hydrogenerator) at the canal. Annually, approximately 500,000 acre-feet would be available at this point during the irrigation season.

The smaller WIS project is a potential 2,000-cfs pumping plant on the Columbia River downstream from Priest Rapids Dam, conveying water to a Black Rock reservoir. A concrete face rockfill dam would create a total reservoir capacity of 860,000-acre-feet. The outflow system would be sized to deliver 1,000 cfs to Roza Canal in conjunction with a hydrogeneration plant.

WIS emphasized that their study does not address issues such as water rights, financial capabilities to construct the project, fisheries issues, environmental mitigation, or geotechnical matters that can only be determined via field investigations. Instead, the study concentrates on the technical and cost aspects for moving Columbia River water via a Black Rock reservoir to the Yakima River basin. In this context, WIS identified no fatal flaws in project feasibility.

Based substantially on the Benton Board/WIS work, in February 2003, Congress authorized the Storage Study, which Reclamation is now conducting.

2.2 Water Exchange Concept

The water exchange concept is to replace, or exchange, Yakima River irrigation water with Columbia River water. This exchange would allow the Yakima River irrigation water to be used for instream flows, dry-year irrigated agriculture, and municipal water supply.

To accomplish this exchange, the Black Rock alternative would pump water from the Columbia River upstream from Priest Rapids Dam (when the flows are in excess of current instream flow targets) for storage in a Black Rock reservoir. The stored water would be conveyed west to Yakima Valley irrigation entities that are situated to receive the Columbia River water into their existing, or modified, distribution facilities. These irrigation entities would not divert Yakima River water for irrigation, thus freeing up the Yakima River water for allotment to other uses. Chapter 3.0 describes the irrigation entities and the amount of water potentially available in the exchange.

A water exchange alternative could respond to the stated congressional intent to provide additional water supply in the Yakima River basin for anadromous fish, existing irrigated agriculture, and future municipal water supply. Study objectives are to fully allocate freed-up Yakima River water to instream flows and municipal water supply in Yakima River basin in full water supply years when there would be no irrigation proration. In dry years, the Yakima River allocation would include water for those irrigation entities subject to proration. The extent that the Storage Study goals could be met would depend on the amount of exchange water made available and the allocation policies determined through the feasibility study process.

3.0 Yakima-Columbia River Water Exchange

3.1 Amount of Potential Water Exchange

A primary consideration as to the viability of a Columbia River water importation alternative is whether existing irrigation water users are so situated and willing to receive Columbia River water in lieu of diverting from the Yakima River. The amount or extent of exchange water that could be secured from willing participants in the lower Yakima Valley is critical in addressing the viability of the Black Rock alternative. Consequently, initial activities of this Assessment are to:

- Identify irrigation entities that may be willing to exchange water.
- Determine the amount of a water exchange.

The foregoing is necessary to define the quantity of imported water that could be exchanged and the configuration of the Black Rock alternative facilities necessary to transport such water from the Columbia River to potential exchange participants. This process requires the development of preliminary appraisal-level plans of how to deliver exchange water to their existing systems and the estimated costs of such systems.

3.1.1 Potential Water Exchange Participants

Potential water exchange participants were identified using the following general criteria:

- The general proximity of existing water delivery facilities to permit gravity delivery from a Black Rock reservoir.
- A willingness of irrigation entities to explore the possibility of a water exchange.
- The classes (nonproratable and proratable) of the irrigation entities' water rights.
- An ongoing or proposed water conservation program designed to reduce surface return flows to the Yakima River.

Applying the above criteria, the following irrigation entities have been identified as potential water exchange participants: Roza Division (Roza Irrigation District); Terrace Heights, Selah-Moxee, and Union Gap Irrigation Districts; and the Sunnyside Division (Sunnyside Valley Irrigation District and eight other irrigation districts, companies, and cities that comprise this division). These entities have expressed their willingness to explore water exchange possibilities. No agreements have been made or negotiated for these entities to make the water exchange.

3.1.2 Existing Water Delivery Systems of Potential Water Exchange Participants

Figure 3-1 shows the location of the main canals of the potential water exchange participants and the relationship to the Black Rock alternative water supply. Roza Canal (with its headworks on the Yakima River at Roza Diversion Dam at river mile (RM) 127.9 about 11 miles upstream from the confluence of the Naches River) serves the Roza Division. The canal extends for 95 miles parallel to and north of the Yakima River through the eastern portion of the middle and lower valley areas of the Yakima Project. The canal conveys water for irrigation to about 72,000 irrigable acres (figure 3-2) within the Roza Irrigation District and for hydroelectric generation at Reclamation's Roza Powerplant. The terminus of Roza Canal is in the vicinity of Benton City in the lower valley.

Selah-Moxee Irrigation District's primary diversion is from the Yakima River near Pomona (RM 123.6). The Selah-Moxee Canal runs parallel to and downslope from Roza Canal and ends in the southeast side of Moxee Valley. Selah-Moxee Irrigation District serves irrigation water to about 5,800 acres. In 1997, the Moxee Ditch Company and the Moxee-Hubbard Irrigation Company, with a total service area of about 2,000 acres, merged into the Selah-Moxee Irrigation District. The Moxee-Hubbard Canal diverts off the Yakima River at RM 116. The Moxee Ditch diverts off the Moxee-Hubbard Canal downstream from the Moxee-Hubbard Canal headworks. The Moxee Ditch and the Moxee-Hubbard Canal run parallel to and downslope of Roza Canal and Selah-Moxee Canal, also ending in Moxee Valley.

Union Gap Irrigation District's Yakima River diversion (RM 114.9) is downstream from the Naches River confluence. The Union Gap Canal runs parallel to and downslope of the above canals through Moxee Valley, then continues in pipeline and flume through the Union Gap. As it nears Sunnyside Diversion Dam, the Union Gap Canal swings upslope of Sunnyside Canal, which it parallels, ending in the vicinity of Zillah. The Union Gap Canal serves about 1,700 acres in Moxee Valley and another 2,950 acres in lower Yakima Valley.

The Sunnyside Division diverts from the Yakima River about 12.5 miles downstream from the confluence of the Naches River at Sunnyside Diversion Dam (RM 103.8) into the 60-mile-long Sunnyside Canal. This canal is on the northeast side of the Yakima River downslope from and parallel to Roza Canal. The terminus of Sunnyside Canal is near Benton City in the lower valley. Some 100,000 irrigable acres lie within the Sunnyside Division.

The Sunnyside Division is comprised of nine irrigation districts and companies, and cities. A January 3, 1945, contract with Reclamation established a Board of Control that oversees the operation and maintenance activities for Sunnyside Canal and joint-use ancillary facilities. The Sunnyside Valley Irrigation District, on behalf of the Board of Control, operates and maintains the joint-use facilities. Reclamation transferred operation and maintenance of Sunnyside Diversion Dam to the Board of Control in June 1959.

Part of the Sunnyside Valley Irrigation District and Grandview Irrigation District service areas, which are members of the Sunnyside Division, are upslope from Sunnyside Canal. A

combination of hydroturbine and electric pumps lift water from the canal to serve these lands. All other lands within these two districts lie downslope from the canal and receive gravity service.

These existing main conveyance facilities are located so that Columbia River water stored in a Black Rock reservoir could be conveyed by gravity through an outflow conveyance system that would intersect Roza Canal mile post (MP) 22.6 at the SH 24 crossing. From this point, water could be transported by new or modified delivery systems for use by potential water exchange participants. A brief summary of existing facilities and the peak irrigation demands upstream and downstream from Roza Canal MP 22.6 follows.

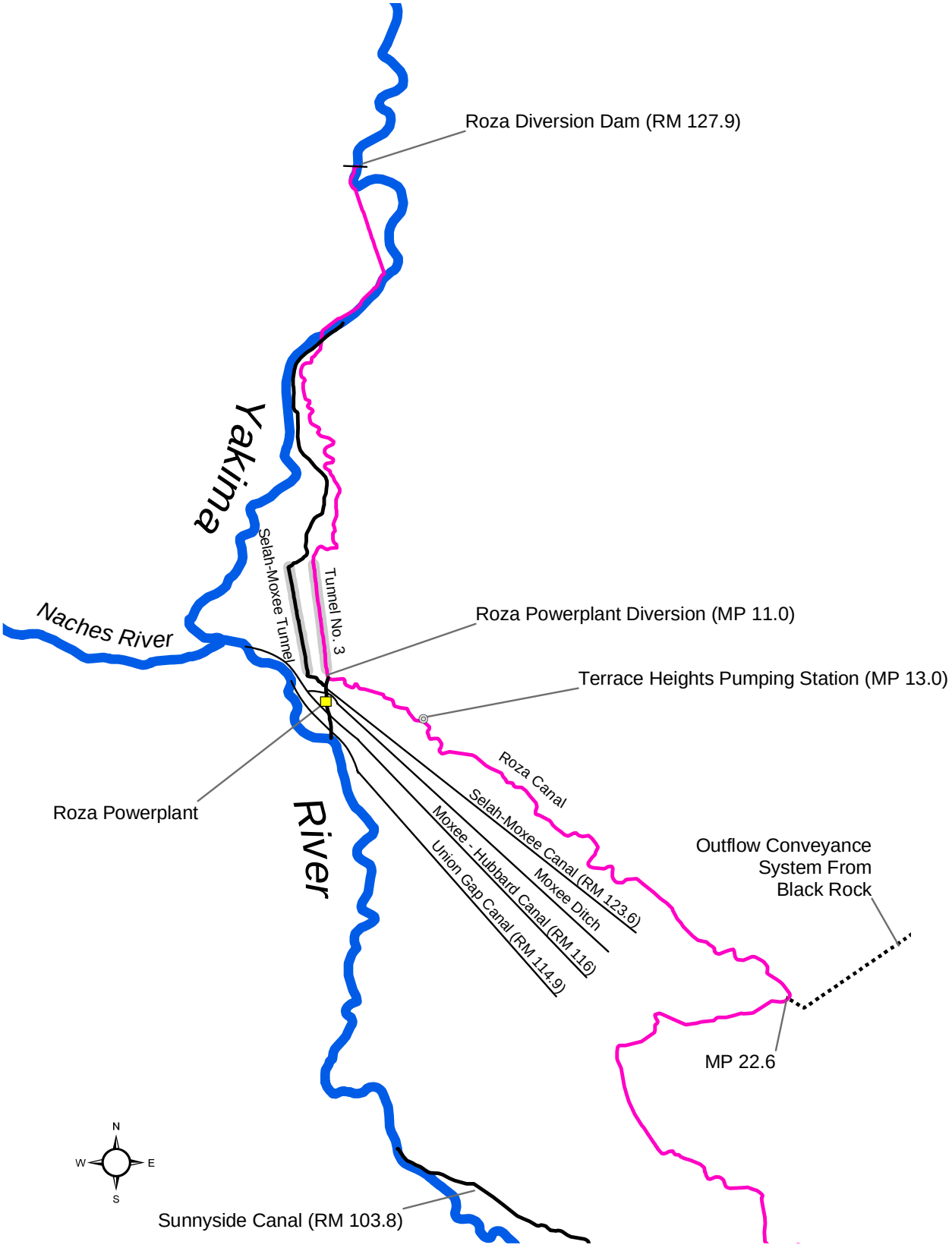

Figure 3-1. Schematic of potential water exchange participants' existing irrigation systems, diversion points (in parenthesis), and connection to the Black Rock alternative

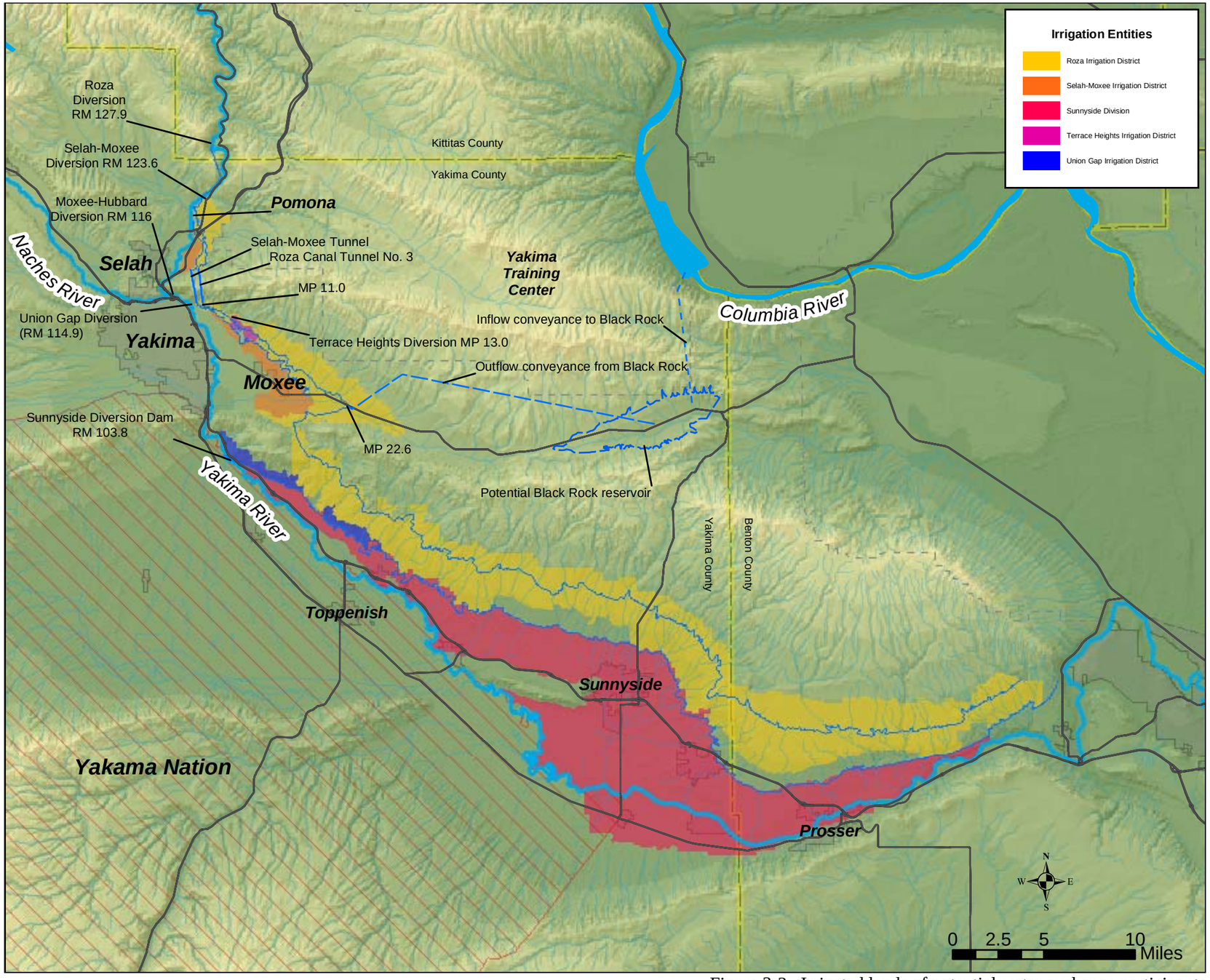

Figure 3-2. Irrigated lands of potential water exchange participants

3.1.2.1 Upstream From MP 22.6 - Roza, Terrace Heights, Selah-Moxee, and Union Gap Irrigation Districts

As shown on figure 3-3, the capacity of Roza Canal at its Yakima River diversion is about 2,200 cfs. Initially, the Roza Canal transports water for irrigation and hydroelectric generation. Upstream from MP 22.6, peak irrigation water demands of the Roza Irrigation District total about 215 cfs. Irrigation requirements upstream from the tunnel No. 3 inlet (MP 8.8) are about 40 cfs for the Roza-Selah lands. At MP 11.0 just downstream from the tunnel No. 3 outlet portal, a bifurcation facility diverts up to 1,020 cfs for use at the 11,250-kW Roza Powerplant. Powerplant discharge reenters the Yakima River at RM 113.3. Downstream from the bifurcation facility, Roza Canal carries water solely for irrigation purposes, and the capacity reduces to about 1,100 cfs. The peak irrigation demand from this point to MP 22.6 is about 175 cfs.

Three pumping stations, located at MP 7.2, 16.8, and 22.5, serve lands upslope from Roza Canal; downslope lands receive gravity service. In addition, Terrace Heights Irrigation District receives water at its MP 13.0 pumping station under an agreement with Roza Irrigation District.

Reclamation operates Roza Diversion Dam and the first 11 miles of Roza Canal; maintenance is a joint responsibility of Reclamation and Roza Irrigation District. Reclamation operates and maintains Roza Powerplant. Roza Irrigation District receives a credit for power generated at this plant to offset power used to run canalside pumping plants required to lift water to upslope lands. Bonneville Power Administration (BPA) markets any excess energy. Roza Irrigation District is responsible for the operation and maintenance of all of the pumping stations and laterals throughout the Roza Division.

Selah-Moxee and Union Gap Irrigation Districts' main conveyance facilities in this area are in close proximity of Roza Canal. The water rights of the two districts are for a maximum 205-cfs rate of diversion. These districts are responsible for the operation and maintenance of their respective water delivery facilities.

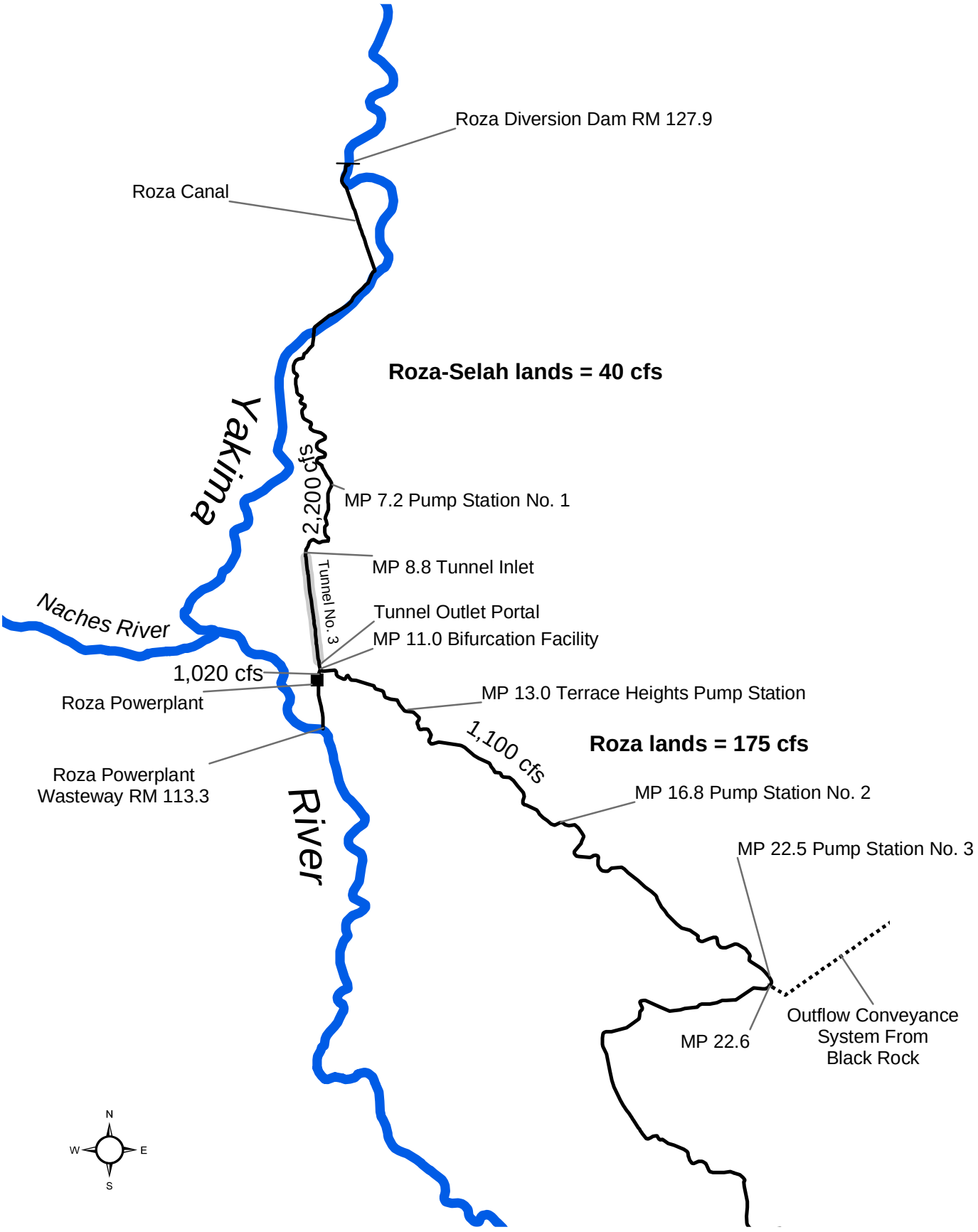

Figure 3-3. Peak Roza Canal flows and facilities upstream from MP 22.6

3.1.2.2 Downstream From MP 22.6 - Roza Irrigation District and Sunnyside Division

Roza Canal conveys Roza Irrigation District's peak irrigation demand (885 cfs) downstream from MP 22.6. In this area, 15 pumping stations serve upslope lands, and downslope lands receive gravity service.

Current appraisal-level water delivery plans provide for service to the entire Sunnyside Division either by a direct connection to the Black Rock outlet facility or through the joint use of some of Roza Irrigation District's facilities. Based on current water rights, Sunnyside Division is entitled to a maximum 1,316-cfs rate of delivery at the canal headworks. Through a Water Right Settlement Agreement reached in the *Acquavella* case, the Sunnyside Division has agreed to a reduction of its water rights to a 1,262-cfs rate of diversion by December 31, 2016.

3.1.3 Potential Exchange Participants' Water Rights

Individual water rights of the identified potential exchange participants represent their maximum water requirements and maximum water exchange potential. The water rights summarized in table 3-1 are based on Yakima River basin adjudication court documents (*Acquavella* case). These data represent the combined water rights of the five potential water exchange participants. Table 3-1 also shows a separation of these rights into proratable and nonproratable components, which are not part of the adjudication court determination, but are presented for planning purposes.

Table 3-1. Current water rights of potential water exchange participants

	Irrigation Entity[1]				
Item	Roza	Terrace Heights	Selah-Moxee[2]	Union Gap[3]	Sunnyside[4]
	(cfs)				
Maximum diversion rate	1,193	10.6	124.6	80	1,316
Applicable month	June	July	July	May	June
	(acre-feet)				
Total right	375,000	2,785	42,023	22,200	435,422
Nonproratable	0	2,206	37,742	17,558	315,836
Proratable	375,000	579	4,281	4,642	119,586

[1] All data applies to diversion at the appropriate Yakima River intake during the April through October irrigation season.
[2]Does not include: (a) the Warren Act contract right specific to lands of the Sub-A water users, and (b) any reduction in the annual use (acre-feet per year) resulting from in-lieu use of measured return flows.
[3]The adjudication court confirmed a flood water right of 1,200 acre-feet to be diverted from March 15 to May 31. No segregation of the total was made by month. This right is not included in the acre-foot tabulation.
[4]Through a Water Right Settlement Agreement filed with the Superior Court for Yakima County, the Sunnyside Division agreed to a reduction of its water rights to a 1,262-cfs rate of diversion and a 415,972-acre-foot volume by December 31, 2016.

These water rights pertain only to demand during the April through October irrigation season. Several districts hold water rights to divert March flood flow water when it is available and primarily use it to prime the water delivery systems prior to the irrigation season. These flood flows mostly spill to the Yakima River. Due to concerns about attracting Columbia River anadromous fish into the Yakima River if Columbia River water were discharged directly to the Yakima River, this assessment assumes the irrigation entities would continue to meet their nonirrigation season water requirements with Yakima River water.

Reclamation developed appraisal-level water delivery plans and related field cost estimates to determine if all or part of these water rights could be provided Columbia River exchange water. The irrigation entities received this information for comment. Section 5.8 of this Assessment presents the appraisal-level plans for two delivery concepts:

- one involving service from Roza Canal to all or a portion of Roza, Terrace Heights, Selah-Moxee, and Union Gap Irrigation Districts
- one involving full service to Sunnyside Division.

The assumptions for individual water service to the potential water exchange participants are:

- Sunnyside Division would receive irrigation water service at the current 435,422-acre-foot per year water right
- Roza Division would receive full irrigation service
- Terrace Heights and Union Gap Irrigation Districts would receive full irrigation service
- Selah-Moxee Irrigation District would receive irrigation service for 80 percent of the total water rights; the Yakima River would continue to serve the 20 percent balance.

The assumptions for service to all potential water exchange participants are:

- During Yakima River basin wet and average water supply years, the Columbia River would supply the full water right amounts.
- In Yakima River dry water supply years when the supply available for proratable water rights is greater than 70 percent, the Columbia River would supply the full nonproratable water right amounts and the same proratable supply if the exchange had not been made.
- In Yakima River dry water supply years when the supply available for proratable water rights is less than 70 percent, the Columbia River would supply the full nonproratable water right amounts and not less than 70 percent of the proratable amounts.

For illustration purposes, table 3-2 identifies the reduced Yakima River diversions that would result for both wet and average, and the most recent driest years. If these irrigation entities agree to the exchange, these reduced diversions would be the amounts of water available for other uses in the Yakima River basin: supplying water for fish habitat flows and future municipal demands, and firming up the irrigation water supply in dry years to not less than 70 percent of the proratable water rights of entities not involved in the exchange.

The years 1994 and 2001 represent the most recent dry-year condition for the Yakima River basin. Proration during these years resulted in a supply of only 37 percent of the proratable

water rights. The 37 percent (551,990 acre-feet) shown in table 3-2 represents the exchange water supply that would be available in a repeat of these dry years taking into account the water rights of the water exchange participants.

Table 3-2. Reduced Yakima River water diversion resulting from a water exchange and the amounts of Yakima River water that would be available for other uses

Potential Participating Entity	Proratable	Nonproratable	Total
	April through October (acre-feet)		
Wet and Average Water Supply Years			
Sunnyside	119,586	315,836	435,422
Roza	375,000	0	375,000
Subtotal	494,586	315,836	810,422
Terrace Heights	579	2,206	2,785
Union Gap	4,642	17,558	22,200
Selah-Moxee	3,424	30,194	33,618
Subtotal	8,645	49,958	58,603
Total	503,231	365,794	869,025
Dry Water Supply Years (1994 and 2001)			
Sunnyside	44,247	315,836	360,083
Roza	138,750	0	138,750
Subtotal	182,997	315,836	498,833
Terrace Heights	214	2,206	2,420
Union Gap	1,718	17,558	19,276
Selah-Moxee	1,267	30,194	31,461
Subtotal	3,199	49,958	53,157
Total	186,196	365,794	551,990

To illustrate the exchange concept, assume:

- the irrigation entities identified in table 3-2 were fully supplied from the Columbia River,
- they would not divert from the Yakima River during April through October, and
- their Yakima River basin water rights were available for other Yakima River basin uses.

Further assume the allocation of this Yakima River water would be:

(1) solely for instream flow purposes in wet and average Yakima River basin water supply years

(2) for irrigation, municipal, and instream flow purposes in Yakima River basin dry years – The Yakima River water supply available due to the exchange would be used to provide not less than a 70-percent supply for those Yakima Project irrigation districts with proratable water rights (with total proratable water rights of 752,000 acre-feet[1]), but not physically able to participate in the water exchange, and to provide municipal supplies. Water in excess of the irrigation and municipal demands would then be used for instream flows.

[1] Two irrigation entities, the Wapato Irrigation Project (350,000 acre-feet) and the Kittitas Reclamation District (336,000 acre-feet) account for 91 percent of the 752,000-acre-foot proratable demand.

Under these assumptions, table 3-3 shows the allocation of freed-up Yakima River water available due to the exchange. It also shows that to meet the irrigation criteria of not less than 70 percent in a dry year, the other proratables need 248,000 acre-feet. The municipal water supply of 30,000 acre-feet would also have to be provided (although this is excluded from table 3-3).

Table 3-3. Allocation of freed-up Yakima River exchange water

Item	Allocation (acre-feet)
Wet and Average Water Supply Years	
Total water available	869,000
To instream flows	869,000
Dry Water Supply Years (1994 and 2001)	
Total water available	552,000
To irrigation (other proratable entities)	248,000 [a]
To instream flows	304,000 [b]

[a] Total water rights of 752,000 acre-feet x 33 percent (37 percent prorationing brought up to 70 percent = 248,000 acre-feet).

[b] Total available after irrigation allocation.

The instream flows would not be released as steady flow year round, but would be managed to simulate the unregulated hydrograph. To provide a frame of reference, a conversion of the above data (acre-feet) into a flow rate (cfs) based on a continuous flow over a 365-day period results in the following allocation to instream flow:

- Wet and average year: 1,200 cfs
- Dry year (i.e., 1994 and 2001): 420 cfs.

Findings: **Exchanging Columbia River water for Yakima River water under the conditions described would create a freed-up block of Yakima River water ranging from about 869,000 acre-feet (the potential exchange participants' total water rights) in wet and average water years to 552,000 acre-feet in extremely dry years such as 1994 and 2001.**

The exchange concept as presented in this Summary Report would firm up, to not less than 70 percent, the water supply of irrigation entities with proratable water rights, but not able to participate in the water exchange; it would provide water to augment instream flows and to municipal needs for future growth.

The Black Rock alternative involving an exchange with only the Roza Division would not meet the study goals. In a repeat of dry years such as 1994 and 2001, Roza Division's junior irrigation

rights of 375,000 acre-feet result in about 140,000 acre-feet of supply (see table 3-2). This is considerably short of the amount necessary to firm up the dry-year water supply of other Yakima River basin junior irrigation rights, let alone provide water for instream flows. It appears a water exchange including senior water right holders is necessary for the Storage Study goals to be realized.

3.2 Columbia River Water Exchange Supply

The March 18, 2004, *Preliminary Appraisal Assessment of Columbia River Water Availability for a Potential Black Rock Project* [3] provides the basis for discussion of the hydrologic analyses on water availability. Two conditions should be recognized when comparing data contained in the water availability assessment to data contained in this Summary Report:

- At the time Reclamation prepared the water availability assessment, an 810,422-acre-foot Columbia River water exchange for April through October was being considered only for the Roza and Sunnyside Divisions. Reclamation later identified Terrace Heights, Selah-Moxee, and Union Gap Irrigation Districts as potential exchange participants. The total water rights of all five exchange participants equals 869,000 acre-feet for April through October.
- The 840,422-acre-foot water service initially identified in the water availability assessment for the Roza and Sunnyside Divisions included both March water (30,000 acre-feet) and April through October irrigation season water (810,422 acre-feet). The majority of the March water is for priming the irrigation system and is returned to the Yakima River. Since one objective of the water exchange concept would be to not directly discharge Columbia River water to the Yakima River, March service for the Black Rock alternative is no longer under consideration. However, all discussion in this Summary Report pertaining to Columbia River pumping is based on the water availability assessment [3] and, therefore, reflects a demand including this 30,000-acre-foot March water.

3.2.1 Seasonal Instream Flow Targets

The potential Columbia River water diversion for the Black Rock alternative would be from Priest Rapids Lake, immediately upstream from the 51-mile-long Hanford Reach (the last undammed, free-flowing reach of the Columbia River in the U.S). The Black Rock alternative primarily affects the 62-mile reach of the Columbia River extending from the mouth of the Yakima River (RM 335.2) to Priest Rapids Dam (RM 397.1). The lower 11 miles of this reach contain water affected by the downstream operation of McNary Dam and are not considered free-flowing habitat. Vernita Bar, about 4 miles downstream from Priest Rapids Dam, is one of the largest spawning areas for fall Chinook salmon.

Four species of anadromous salmonids inhabit or migrate through the Hanford Reach: spring, summer, and fall Chinook salmon (*Oncorhynchus tshawyscha*); summer steelhead (*O .mykiss*); coho salmon (*O. kisutch*); and sockeye salmon (*O. nerka*). The Endangered Species Act (ESA) lists the Upper Columbia River Spring Chinook Salmon Evolutionarily Significant Unit and the Upper Columbia River Steelhead Evolutionarily Significant Unit as endangered. Only fall Chinook salmon are known to spawn and rear in the Hanford Reach. The other anadromous species migrate through as adults returning to upriver spawning areas, while smolts travel through the area on their downstream migration.

The National Oceanic and Atmospheric Administration, National Marine Fisheries Service's, (NOAA Fisheries) December 2000 Biological Opinion of operation of the Federal Columbia River Power System (FCRPS) [4] establishes seasonal instream flow targets downstream from Priest Rapids, McNary, and Bonneville Dams for ESA-listed fish. Flow targets facilitate spawning and downstream passage of juveniles, and accommodate returning adult salmon and steelhead. The November 30, 2004, NOAA Fisheries FCRPS Biological Opinion [5] retains the same instream flow targets as the 2000 Biological Opinion.

FCRPS operations accommodate other flow objectives, not part of the Biological Opinion, for nonlisted salmon downstream from Priest Rapids Dam at Vernita Bar. Table 3-4 summarizes all seasonal instream flow targets downstream from Priest Rapids Dam.

Table 3-4. Seasonal flow targets and planning dates for the main stem Columbia River

	Fall Through Spring Targets		Summer Targets	
Columbia River Location	Dates	Flow (cfs)	Dates	Flow (cfs)
at Priest Rapids Dam - transport target[a]	4/10 - 6/30	135,000	NA	NA
at Priest Rapids Dam - spawning target[b]	10/10 - 6/30	55,000	NA	NA
at McNary Dam - transport target[a]	4/10 - 6/30	220,000 - 260,000[c]	7/01 - 8/31	200,000
at Bonneville Dam - spawning target[a]	11/1 through April	125,000 - 160,000[d]	NA	NA

[a] as per 2000 FCRPS Biological Opinion [4] for listed species

[b] pertains to nonlisted species (Chinook salmon) as per Vernita Bar Agreement; would govern in October; after 4/10, the 135,000 cfs minimum governs

[c] objective varies according to water volume forecasts

[d] objective varies based on actual and forecasted water conditions

3.2.2 Water Supply in Excess of Seasonal Instream Flow Targets

The hydrologic basis for the 2000 Biological Opinion [4] is a BPA computer model (Hyd-Sim) which includes the significant United States Federal and non-Federal dams and the major Canadian projects on the main stem Columbia River and its major tributaries. This computer model contains a data set of runoff from 1929-1978 to which current operations are imposed. In this data set, the 1930s and 1940s are the controlling dry years of the Columbia River water supply. Given a set of operating parameters for each project, BPA determines the Columbia River operation that best minimizes the impact on each project and optimizes use of the water resources. Model output includes information on inflow, outflow, end-of-month reservoir elevations, power generation at each project, and monthly average flows at different target points on the river.

Table 3-5 presents the average monthly volumes of water historically available in the vicinity of Priest Rapids Dam after meeting all current downstream instream flow targets. This assessment assumes the average monthly volumes are available for diversion each day of the month.

Table 3-5. Average monthly water available for pumping in the vicinity of Priest Rapids Dam in excess of instream flow targets

(Flows above 125,000 cfs Bonnneville Dam Nov-Apr; 260,000 cfs McNary Dam Apr-Jun; 200,000 cfs McNary Dam Jul-Aug; 135,000 cfs Priest Rapids Dam Apr-Jun; 55,000 cfs at Priest Rapids Dam Sept-Oct)															
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr2	May	Jun	Jul	Aug1	Aug2	Sep	Total
1929	1387	0	0	1286	0	0	0	0	0	0	0	0	0	640	3313
1930	1844	0	0	0	373	0	0	0	0	0	0	0	0	834	3050
1931	1587	0	0	0	0	0	0	0	0	0	0	0	0	1095	2683
1932	1666	0	0	0	0	2274	608	971	2552	234	216	0	0	801	9322
1933	1451	0	1537	5222	3289	0	0	0	0	5587	5137	0	0	1419	23643
1934	2858	2591	9752	13415	7578	4848	2808	927	757	0	0	0	0	729	46263
1935	1543	0	963	4611	4831	0	0	0	0	0	26	0	0	879	12853
1936	1667	0	0	0	0	123	0	0	3883	0	0	0	0	440	6114
1937	1662	0	0	0	0	0	0	0	0	0	0	0	0	530	2192
1938	1828	0	829	5977	920	3548	59	0	3644	0	0	0	0	860	17665
1939	1490	0	0	1903	0	347	0	0	0	0	0	0	0	509	4248
1940	1811	0	324	1010	177	3441	0	0	0	0	0	0	0	380	7143
1941	1470	0	1013	2094	0	0	0	0	0	0	0	0	0	637	5214
1942	1314	0	3706	5673	260	0	0	0	0	171	463	0	0	585	12174
1943	1632	0	1387	4996	3709	4074	1784	593	3516	1462	2075	0	0	512	25741
1944	1458	0	89	1731	0	0	0	0	0	0	0	0	0	734	4012
1945	1462	0	0	0	0	0	0	0	0	0	0	0	0	315	1777
1946	1690	0	231	3133	2148	4239	482	39	4457	0	857	0	0	904	18181
1947	1060	0	5174	5675	4199	4367	0	0	2363	0	236	0	0	737	23810
1948	3993	1699	2887	6072	1220	2026	81	0	4311	15620	2691	0	0	1927	42528
1949	1814	0	955	2297	1540	6525	0	695	3846	0	0	0	0	205	17877
1950	1490	0	156	3091	5026	7537	759	281	1790	7856	3747	0	0	1161	32895
1951	2294	2627	6406	9109	8943	5173	1000	1050	6410	0	1613	0	0	1416	46043
1952	3124	412	3340	4990	3232	2978	405	220	5279	0	0	0	0	513	24494
1953	1422	0	0	2958	4782	184	0	0	562	3934	1955	0	0	885	16682
1954	1747	81	2368	4107	4813	2541	685	0	3173	6281	3923	952	0	4452	35123
1955	2454	1170	2056	1044	0	0	0	0	0	7265	6264	0	0	1037	21289
1956	2271	1976	6450	10088	3284	6679	1409	2216	8067	7435	2711	0	0	875	53461
1957	1725	0	2704	3533	0	2546	1255	0	3918	5691	0	0	0	514	21885
1958	1373	0	398	3136	3955	2876	0	0	3131	1951	0	0	0	657	17477
1959	1394	1019	3747	8782	5011	2609	1175	0	1410	5052	3306	0	0	3984	37488
1960	4694	3082	4817	4475	1360	2090	2689	200	0	481	372	0	0	839	25100
1961	1623	553	964	3981	4979	3993	1372	0	389	8332	0	0	0	384	26570
1962	1401	0	59	3733	0	0	1484	626	0	0	0	0	0	517	7821
1963	1587	1047	3703	3899	2543	1211	0	0	0	0	41	0	0	1006	15038
1964	1240	0	375	3641	660	0	0	0	0	5979	4743	0	0	1657	18296
1965	2743	159	7388	10836	8165	5171	327	626	3835	1899	243	0	0	667	42059
1966	1579	223	1993	4767	0	92	683	0	0	0	698	0	0	589	10624
1967	1344	0	1184	5768	5984	650	842	0	0	7189	3661	0	0	1208	27830
1968	1593	220	2042	4925	4216	2446	0	0	0	896	2701	0	0	2291	21331
1969	2484	1528	2892	8023	4813	3118	2412	1086	6486	629	185	0	0	619	34276
1970	1454	0	530	5392	3648	497	0	0	0	1986	0	0	0	0	13506
1971	1185	0	452	7606	9358	4092	564	455	7128	4962	3308	0	0	792	39903
1972	1158	103	2025	6758	8114	13880	3228	0	6524	10616	4977	529	0	1421	59333
1973	1545	0	2564	5537	0	0	0	0	0	0	0	0	0	0	9646
1974	1300	0	4814	13853	9371	6685	1932	1477	6253	8111	7671	129	0	1513	63110
1975	1150	0	800	5056	2478	3927	0	0	2225	2737	5096	0	0	801	24270
1976	1888	2160	8488	8839	5041	3371	1637	335	4934	106	3843	1453	0	5103	47198
1977	1753	0	313	1936	0	0	0	0	0	0	0	0	0	431	4434
1978	938	0	2243	3743	1318	4746	473	0	1584	0	1131	0	0	1036	17213
Average	1773	413	2082	4574	2827	2498	603	236	2049	2449	1478	61	0	1041	22084
# of Years Water Is Available															
	50	17	41	44	35	35	30	16	27	26	29	4	0	48	

Findings: Columbia River water in excess of seasonal instream flow targets is physically available for diversion, but not during every month.

3.2.3 Water Delivery Criteria for Potential Exchange Participants

Appraisal-level water delivery designs under consideration at the time Reclamation prepared the water availability assessment [3] indicate that Columbia River water physically could be delivered to serve all of the Roza and Sunnyside Division lands in lieu of their current Yakima River diversions. The maximum flow rate required by the Divisions was assumed to be measured by the current water rights (i.e., 1,193 cfs for Roza and 1,316 cfs for Sunnyside). Therefore, the water availability assessment uses a 2,500-cfs peak water exchange requirement.

For this Assessment, a full irrigation water supply consists of the sum of all authorized nonproratable water and: (a) 100 percent of the proratable water in wet and average water years, and (b) not less than 70 percent of proratable water in Yakima River basin dry years. Table 3-6 shows the March and April through October Columbia River water supply that would need to be delivered to the Roza and Sunnyside Divisions in wet and average water years and in a repeat of the 1994 and 2001 Yakima River basin dry years. The distribution by month of the total allocation is based on the current water service contracts and the adjudication (*Acquavella* case) determinations.

Table 3-6. Columbia River water supply needs based on water rights of Roza and Sunnyside Divisions

	Division (acre-feet)		
Wet and average water years	(numbers are rounded)		
	Roza	Sunnyside	Total
April	37,500	52,160	89,660
May	56,250	72,670	128,920
June	71,250	74,370	145,620
July	71,250	76,020	147,270
August	71,250	76,020	147,270
September	45,000	56,910	101,910
October	22,500	27,260	49,760
Subtotal	375,000	435,400	810,400
March	18,000	12,000	30,000
Total	393,000	447,400	840,400
Dry years such as 1994 and 2001			
April through October	262,500[a]	399,500[b]	662,000
March	18,000	12,000	30,000

[a] 375,000 acre-feet proratable x 70 percent = 262,500 acre-feet
[b] 119,600 acre-feet proratable x 70 percent = 83,700 acre-feet + 315,800 acre-feet nonproratable = 399,500 acre-feet

The water availability assessment considers the option of pumping directly from the Columbia River to irrigation canals serving Roza and Sunnyside Divisions to meet the irrigation season demands indicated above. The maximum combined peak water right is about 2,500 cfs in June.

Table 3-7 shows the water supply that could be delivered assuming a 2,500-cfs pumping capacity and diverting only when Columbia River flows were in excess of the instream flow targets.

Table 3-7. Direct delivery water supply based on 810,400-acre-foot April - October water rights

	Maximum Supply	Average Supply	Minimum Supply
Water delivered	736,800 acre-feet	437,200 acre-feet	142,600 acre-feet
Percentage of water rights delivered	91	54	18
Percentage of water rights shortage	9	46	82

Findings: Under current assumptions, direct delivery of Columbia River water to Roza and Sunnyside Divisions without storage would not be viable due to the differences in timing of water availability and water demands.

3.2.4 Storage and Pumping Plant Capacities

Based on information contained in the WIS report [2], this Assessment uses 1,300,000 acre-feet as the maximum active reservoir capacity. Analyses of various reservoir sizes and pump capacities identifies 800,000 acre-feet as the smallest reservoir capacity that provides sufficient carryover to meet the water delivery criteria based on available Columbia River water supply.

The water surface of Black Rock reservoir would be about 1,400 feet higher than the Columbia River. Large pumps would be necessary to lift water up that distance. Reclamation's assessment [4] examines the Black Rock alternative configuration consisting of:

(1) maximum active reservoir capacity (1,300,000 acre-feet as identified in the WIS report [2]) with minimum pumping capacity (3,500 cfs), and

(2) minimum active reservoir capacity (800,000 acre-feet) with minimum pumping capacity (6,000 cfs) to fill the reservoir.

Both alternative configurations (large and small reservoirs) were designed to meet the total water requirements (840,400 acre-feet) of the Roza and Sunnyside Divisions. Pumping capacities influence the amount of critical carryover. A larger reservoir with smaller pumping capacity would require more carryover to eliminate water shortages than a smaller reservoir with larger pumping capacity.

The water availability assessment also examines the two following pump rate scenarios and various pumping durations for these scenarios:

Pump Rate Scenarios

- Pumping only during periods of low electricity use (light load hours), which is from 10 p.m. to 6 a.m., Monday through Saturday and all day Sunday.
- Pumping during both light and heavy load hours (periods of highest electricity use - 6 a.m. to 10 p.m., Monday through Saturday).

Pumping Durations

- Pumping during the 3 months of April, May, and June when the peak Columbia River runoff occurs
- Pumping during the 10 months of November through August.
- Pumping throughout all 12 months.

Findings: **As the water availability assessment [3] shows, and based on the current assumed maximum and minimum active reservoir capacities, only one pumping scenario would meet the wet- and dry-year irrigation water delivery criteria. That scenario is for year-round pumping during both light and heavy load hours when Columbia River flows are in excess of instream flow targets and there is reservoir capacity available to store water. This scenario requires a minimum 3,500-cfs pumping capacity for the 1,300,000-acre-foot active capacity reservoir and a minimum 6,000-cfs pumping capacity for the 800,000-acre-foot active capacity reservoir.**

4.0 Water Rights and Water Service Contracts

4.1 Introduction

Lower Yakima River water users take natural flows, releases of stored water, and return flows under Federal contracts, a Federal consent judgment, and State water rights. Reclamation operates the Yakima Project to deliver water from all these sources to Federal contractors, senior appropriators, and other diverters. A potential alternative for exchange of Columbia River water for current use of Yakima River water by some lower Yakima River appropriators raises questions of the best legal pathway to acquire water rights that would allow diversion of Columbia River water. The identified exchange alternative also raises concerns about potential impacts on existing water rights and water service contracts.

Reclamation allocates and delivers water to water users under the authority of Federal contracts and the Consent Judgment [in Kittitas Reclamation District v. Sunnyside Valley Irrigation District (Civil 21, E. Dist. Wash., 1945) (1945 Judgment)]. The 1945 Judgment set up a unique allocation scheme for the Yakima River basin by creating a two-tier system of water rights. Water rights associated with storage, and the May 10, 1905, Federal appropriation for the Yakima Project are generally "proratable," i.e., susceptible of pro rata reduction in times of scarcity. Pre-Yakima Project senior rights are nonproratable and cannot be interrupted or reduced until all the proratable rights are regulated to zero. Historically, there has never been a water shortage that completely curtailed diversion by proratable users.

In 1977, Reclamation formalized operating procedures that had for many years tracked the parameters laid out in the 1945 Judgment. Reclamation estimates the total water supply available for Yakima Project purposes in March of every year and forecasts the amount of proration, if any, that will apply for the coming irrigation season. Total water supply available is recalculated on a regular basis during the irrigation season and the proration percentage updated. In this way, Reclamation has institutionalized the equitable sharing of the available water supply among the competing irrigators in the basin, as the 1945 Judgment envisioned. Though a final decree in the Acquavella adjudication will set state-law-based quantities and priorities for the basin's water users, it will not completely supersede the administrative and operational aspects of the 1945 Judgment.

Water right and post-1905 contract regulation has historically been very relaxed, but that trend changed with a priority call through the Acquavella court in 2001, a year of 37 percent proration. Tighter regulation of unauthorized and out-of-priority use, and more careful management of existing water supplies are the accelerating trends. Clearer water quantifications from the Acquavella adjudication allow the newly-created State watermaster for the Yakima River basin to reduce unauthorized or out-of-priority use in all years. In June 2004, the Acquavella court entered a permanent order for curtailment of all non-Project post-1905 water rights in water short years. Groundwater and Yakima Project return flow have not been integrated into the regulatory scheme, but inevitably will come under increased scrutiny. Universal water measurement,

diversion reporting, and regulation are already helping stretch available supplies within the context of existing water rights.

Both State and Federal law apply to water use in the Yakima River basin. For any given use, there is a complex interplay of Federal and State jurisdiction, management, and regulation. For the purposes of this water rights analysis, it is assumed that Reclamation's operational scheme, which is based on the 1945 Judgment, the 1855 Yakama Nation Treaty, and the Washington State law of water rights, will continue to guide water allocation decisions.

4.2 Current Status

4.2.1 Participating Irrigation Entities

Two divisions of the Yakima Project (Roza and Sunnyside) and three irrigation districts (Selah-Moxee, Terrace Heights, and Union Gap) have expressed an interest in water exchange possibilities. Chapter 3.0 describes the location and features of these entities' Yakima River water delivery systems.

4.2.2 Water Service Contracts

In general, Reclamation has executed two types of contracts in the Yakima River basin – repayment contracts and water supply contracts. Repayment contracts make up the majority of the contract-based commitments in the basin. Water supply contracts are typically Warren Act contracts, which supplement the supply of water users who depend on pre-Yakima Project natural flow water rights. In other instances (e.g., the Sunnyside Valley Irrigation District contract of 1945), the contract applies to conditions of both repayment and water supply.

The repayment contracts of the lower basin entities were originally executed in the early years of the Yakima Project. These early contracts are perpetual and not fixed-term arrangements. They have subsequently been modified and expanded, but have not been amended or renegotiated since 1951.

Except for Roza Irrigation District, the irrigation entities who might participate in a potential exchange alternative hold pre-Yakima Project natural flow rights. Limiting agreements executed in the early 1900s as a condition for Federal commitment to the Yakima Project set limits on these pre-Project water rights. Federal courts and the State Acquavella adjudication have interpreted and applied the limiting agreements as real limitations on water rights that continue to bind the signatory entities.

If the exchange alternative were to be constructed, Reclamation and the exchange participants may have to engage in a detailed review of Federal water contracts and any multi-party agreements. This review would involve a simultaneous evaluation of the participants' existing state-based water rights, Federal contract entitlements, any new appropriations from the Columbia River, and the operational parameters of the exchange alternative. For each potential exchange participant, the review would generally involve the following:

- Roza Irrigation District: repayment and water supply contract
- Sunnyside Division: repayment and water supply contract, settlement agreement
- Terrace Heights Irrigation District: two Warren Act contracts
- Selah-Moxee Irrigation District: three Warren Act contracts
- Union Gap Irrigation District: six Warren Act contracts.

4.3 Water Appropriation From the Columbia River

4.3.1 Background

The identified exchange alternative would be based on diversion of Columbia River water. Authorization for such a diversion must comply with Washington State law. Washington instituted a moratorium on new water rights from the Columbia River in 1991, shortly after Snake River sockeye salmon were listed under ESA. In 1997, Washington lifted the moratorium with revisions to Chapter 173-563 WAC. The revisions mandated an evaluation of impacts on fish and existing water rights in consultation with Federal agencies and Indian tribes.

Since that time, Washington has launched a new program, the Columbia River Initiative, to evaluate and apportion available Columbia River water resources. That program is expected to result in rulemaking to establish a new water management program for the Columbia River.

4.3.2 Columbia River Initiative

In September 2004, Governor Gary Locke announced that the effort to adopt new rules under the Columbia River Initiative was being suspended. Instead, the Governor's office will develop recommendations for consideration by the 2005 Legislature. The recommendations are to include both proposed legislation and draft rules. State water policy for securing a new water right from the Columbia River, and the use of that right for a potential exchange alternative, could be affected by further legislative action.

4.3.3 Diversion Authorization Approaches

Several approaches have been identified for acquiring State authorization to divert and store Columbia River water for benefit of the Black Rock alternative. The following discussion identifies some strengths and weaknesses of each approach.

4.3.3.1 Application Under State Water Code

RCW 90.03.250 through -.340 deals with new appropriations of public water. To make a new appropriation, Reclamation would file an application with Ecology to appropriate public water. This application would carry the priority date of the withdrawal notice[2], a point of diversion at

[2] See section 4.3.5 for a discussion of the operative Washington process for Federal water appropriations.

Priest Rapids Dam, and a place of use in the Yakima River basin. To maintain the maximum flexibility for the exchange water, the United States would assert multiple purposes of use – irrigation, power, municipal and industrial use, fish, wildlife, and recreation. The claimed quantity would depend on the final design and operation scheme of the preferred exchange alternative.

Another section of the water code, RCW 90.03.370, describes the water appropriation procedure for storage reservoirs. Under the statute and WAC 508-12-260 and -270, a reservoir permit is required to construct a barrier across a stream, channel, or water course that would retain a portion of the annual runoff for beneficial use. Ecology may authorize reservoirs to be filled more than once per year or more than once per season of use to ensure that existing storage capacity was effectively and efficiently used.

Assuming a reservoir permit is required, such permit would be considered the primary right. Application(s) for secondary permit could also be filed for withdrawal of the stored water for off-site beneficial use. The secondary permit(s) would name the reservoir as the source of supply. The existing water rights of the exchange participants could be amended to include the reservoir as an additional source of supply. However, this statutory and conceptual framework does not make the actual appropriation from the Columbia River easier or more certain.

A new State appropriation under any of the above processes would face three significant hurdles. There is a slow queue of pending applications for Washington water rights, a functional moratorium on new diversions from the Columbia River, and a NOAA Fisheries bucket-for-bucket flow replacement policy for Columbia River withdrawals that occur during flow target periods.

While these hurdles are not fatal flaws, they would be significant challenges. Ecology may expedite processing of applications when the proposed use is nonconsumptive and if approval would substantially enhance or protect the quality of the natural environment. The functional moratorium is linked to the direction of the Columbia River Initiative program.

4.3.3.2 Columbia Basin Project Withdrawal and Transfer

Through a May 16, 1938, filing with the State pursuant to RCW 90.40.030, the United States gave notice of its intent to develop the Columbia Basin Project (CBP). Columbia River water sufficient for this purpose was withdrawn from appropriation. Water rights for existing power development and the first half of the irrigation project have been perfected. The withdrawal continues in effect for water to benefit the second half of the irrigation development.

The concept of moving a part of the CBP withdrawal to the Black Rock exchange alternative presents several challenges. The most obvious is that there would not be enough water for the second half of the CBP. Another obstacle would be the specific purpose and place of use detailed in the notice of intent. CBP entities have, in the past, suggested a quid pro quo where some water is transferred to Yakima River basin users in return for new service areas on the CBP.

Washington water law does not allow transfer of unperfected rights. RCW 90.03.380 limits transfers to water rights that have been applied to beneficial use. Water rights that have been granted a certificate, and, in some cases, permitted water rights can be transferred. It is unlikely that the CBP withdrawal could be changed to a new point of diversion and place of use under State law.

4.3.3.3 In-Lieu Exchange

The concept of exchanging Columbia River water for Yakima River water currently used by lower Yakima Valley irrigation entities has been applied by Reclamation at the Umatilla Project in Oregon. The strategy in Umatilla was to allow diversion of Columbia River water under a new appropriation for fish passage purposes in the Umatilla River. As the Columbia River water was diverted into the Umatilla Project, it was routed to irrigation uses, while the existing supply native to the Umatilla basin was designated to assist fish in the lower Umatilla River. Oregon's legislature had to craft a statute to allow the exchange (See Oregon Revised Statutes 540.533 to 540.537), but over time, it has proved to be a worthwhile and workable arrangement.

The main advantage of an in-lieu exchange is that it would avoid some of the State processes associated with a new appropriation and treat the new diversion as an additional point of diversion. Assuming the in-lieu exchange were based on a model similar to the Umatilla Project, the new Columbia River diversion could carry a December 28, 2004, priority date, but a purpose of use limited to fish and wildlife. Individual participants in the Black Rock alternative could execute agreements to make their Yakima River supplies available for instream flow, with certain limitations and the possibility of reversion in an emergency.

Washington's transfer statute, RCW 90.03.380, sets out the process for transfers and changes to water rights. Ecology has historically interpreted the statute to preclude diversion of new and hydrologically unrelated sources under color of existing water rights. However, recent Supreme Court rulings may be interpreted to more generally allow changes of water rights between hydrologically unrelated sources. As long as there was no impairment to other water rights, including State-adopted minimum instream flows, these exchanges may be permissible. Nevertheless, new State legislation similar to Oregon's may be necessary.

Diversion at Priest Rapids Lake would require tapping a new source of water – the Columbia River. Therefore, Washington law, as currently interpreted by Ecology, would not allow an exchange alternative diversion from the Columbia River under color of the Yakima Project water rights unless the Yakima River rights were subordinated to existing Columbia River rights in the reach from Priest Rapids to the McNary pool. Also, Ecology is likely to further condition the Columbia River point of diversion by limiting it to the supply available to the original Yakima River rights. This defeats one of the central purposes of the Black Rock alternative – augmentation of supply in low-water years.

4.3.3.4 Modify Existing Rights

Reclamation and the exchange participants could apply for a modification to the existing Yakima Project water rights to include a new, additional point of diversion on the Columbia River. This

approach would be very similar to an in-lieu exchange, and has most of the same benefits and difficulties. A water right change to include a new point of diversion under RCW 90.03.380 would be a more simple approach that would not require new legislation. However, the underlying water right could not be expanded or enhanced in the process. Water right changes that enhance or expand the underlying right are generally prohibited under Washington law.

Adding a point of diversion on the Columbia River would have problems. Ecology has not, as a historical rule, allowed existing water rights to add points of diversion that tap hydrologically discrete water sources. The rationale is that the new diversion would diminish the new source and impermissibly affect water rights on that system. If there were water rights dependent on the new source, any new impact should be authorized by a new, junior water right. In special circumstances, Ecology has allowed changes in source under existing rights; however the new and old sources in those special cases were closely related both geographically and temporally.

4.3.4 Comparison of Approaches

Table 4-1 presents a brief subjective comparison of the approaches described above. All have the common basis that the United States (Reclamation) would be the initiating entity and that applications must be filed with Ecology under State law. The indicated viability ranking for securing State approval in a timely manner assumes current legal and political conditions. Regardless of their indicated viability, all approaches should receive further evaluation.

Table 4-1. Approaches for acquiring State authorization to divert Columbia River water

Approach	Initiating Entity	Priority Based on a Withdrawal	Application to State Required	State Legislation Required	Existing Rights Amended	Potential for Controversy	Viability Ranking *
RCW 90.03 Application(s)	United States	Possibly	Yes	No	No	Medium	2
Columbia Basin Project Transfer	United States	Yes	Yes - for changes	Possibly	Possibly	High	4
In-Lieu Exchange	United States and Districts	Possibly	Yes	Yes	No	Low	1
Modify Existing Yakima River Basin Rights	United States and Districts	Yes	Yes – for changes	No	Yes	High	3
*Sequential ranking with 1 being the most viable.							

4.3.5 December 2004 Notice of Withdrawal Made

Section 8 of the 1902 Reclamation Act directs Reclamation to acquire new water rights under prevailing state water law. The United States has a unique status under Washington law. The Washington legislature in 1905 enacted RCW 90.40 to facilitate construction of the Yakima Project and other Reclamation projects in Washington. This statute allows the withdrawal of public waters from appropriation upon request of the Secretary of the Interior.

Under RCW 90.40, the United States would notify Washington that it intends to make examinations or surveys for the use of specified waters of the Columbia River. Said waters are then not subject to appropriation by others for a period of 1 year. If the United States certifies in writing within the 1-year period that the alternative contemplated in the notice appears to be viable and investigations will be made in detail, the waters would continue to be withdrawn from appropriation for 3 years and such further time as the State may grant by extension.

On December 28, 2004, Reclamation filed the requisite notice with the Washington Department of Ecology and Department of Natural Resources. Reclamation filed the notice for an exchange alternative as a preliminary measure to secure a 2004 priority date for any new water rights that the alternative might require. The withdrawal is not an application to appropriate water, however. At some point in the alternative development, if construction is authorized, funded, and certain, the United States would file an application to appropriate public water under the RCW 90.03 water code process, "such appropriation to be made, maintained, and perfected in the same manner and to the same extent as though such appropriation had been made by a private person, corporation, or association . . ." RCW 90.40.030. If an application were filed, it would relate back to the initial notice by the United States.

4.4 Water Rights

A primary concern of the irrigation districts that might participate in a water exchange alternative is that their existing water rights for appropriation of Yakima River water not be jeopardized or compromised. The United States holds the State water rights of the Sunnyside and Roza Divisions on their behalf. For Union Gap, Selah-Moxee, and Terrace Heights Irrigation Districts, the United States holds the title to the Warren Act contract water rights. Whether a proposed exchange would require a change in State water rights for these two divisions and three districts would depend heavily on how the exchange alternative would legally affect its withdrawals from the Columbia River system.

4.4.1 Relinquishment

Relinquishment for nonuse could become an issue if the Yakima River water supply were not consistently put to a beneficial use as a result of the exchange. Even if the exchange were carefully monitored, the State relinquishment statutes RCW 90.14.130 through -.180 would require use within a 5-year window to avoid forfeiture. The application of the relinquishment statute could be completely avoided if the exchange cited fish and wildlife as the beneficial use for the Columbia River diversion and existing Yakima River supplies.

The potential for relinquishment of both Yakima River water and Columbia River water under State law will need to be resolved if an exchange alternative goes forward. These issues would become clearer as the United States begins to resolve its case-in-chief in Acquavella, as the adjudication of all the United States' beneficial uses in the Yakima River basin, and as the operational parameters for the exchange alternative are refined.

4.4.2 Priority Date

A key question is whether a water exchange would require a different priority date and changes to other elements of the existing State water rights. The priority date would be intimately tied to the source – the Columbia River – and the theory under which the new diversion would be authorized. Regardless of the exchange water's priority, it is possible that a priority call on the Columbia River could curtail water use from that source. Nor is priority the only criterion for Columbia River diversion interruptions. While earlier priority would be desirable, the Columbia River system faces supply challenges that may translate to State- or Federal-based regulation of diversions for the exchange program.

If the exchange participants were sure that they could shift back to the Yakima River source in the event the Columbia River source were interrupted, then the priority date and some risks associated with the new supply would no longer be an issue. The exchange participants would be in the same position they are today. To effect this backup plan, the exchanged Yakima River water could assume the status of standby or reserve supply for these entities, a position that could be advantageous for relinquishment analysis.

Priority date is a poor proxy for the actual risk of curtailment of Columbia River water. More relevant is the size of the storage facility, the flexibility of the diversion schedule, and the ability to shift to the Yakima River source in a shortage situation.

4.4.3 Source/Point of Diversion

Source of water is an element of a State water right. Because of jurisdictional limitations, all Acquavella-confirmed rights, both for Reclamation and for the potential exchange entities, have the Yakima River and its tributaries as the source of water.

For the Black Rock alternative, source would be an issue primarily for the United States' water rights. Reclamation, from the earliest days of the Yakima Project, has managed the basin's storage system as an integrated whole. Individual contractors and divisions of the Yakima Project do not own storage space or have contractual rights to particular storage facilities. Assuming the Black Rock storage facility would be fully integrated into the Yakima Project storage system, the water rights of the individual end users would need little, if any modification.

For the five potential exchange participants, the confirmed points of diversion would be their headworks on the Yakima River. The delivery points identified in this Summary Report for the exchange water would not be on the Yakima River, but at points along the various entities' canals. These delivery points would not be points of diversion in the normal sense. There is no clear State law requirement to document these delivery points in State water rights.

If, as discussed above, the Columbia River withdrawals were authorized as separate primary water rights distinct from the secondary water rights of the end users, there would probably be no requirement to modify the end users' water rights to include the Columbia River source or point of diversion. A simple cross reference or note in the water rights would be sufficient. The Columbia River water rights would be separate, and additive to each exchange participants'

Yakima River rights. Each entity would have additional water rights confirmed in the name of the United States on their behalf. No significant modifications to Yakima River rights would be required.

4.5 Water Service Contracts

The potential exchange participants are firmly opposed to reopening, renegotiating, amending, or superseding their current contracts. Their primary concerns are that new or amended contracts would require National Environmental Policy Act clearance and compliance with the Reclamation Reform Act and the Endangered Species Act, and would introduce current standard Reclamation contract provisions that would be less favorable to their interests.

Therefore, an underlying assumption is that Reclamation would avoid, to the extent possible, any changes to their Federal contracts. New agreements or memoranda of understanding, however, may be necessary to affect the actual exchange of water.

Findings: **If a new appropriation is necessary for the exchange alternative, it must comply with Washington State law. Substantial legal issues will have to be addressed before diversions could be made. Current obstacles are the unknowns surrounding State water policy on the Columbia River, the State administrative process, and the consultation and mitigation requirements of State and Federal law. Legal authorization of the potential exchange alternative would take time.**

The United States has filed a notice of withdrawal with Washington. This notice is not a water right application, or an indication of the identified exchange alternative's viability. The withdrawal is a preliminary step that reserves a 2004 priority date if the identified alternative were constructed.